

WHAT IS CLAIMED IS:

1. An optical multi-demultiplexer comprising:
  - a substrate;
  - input waveguides formed on the substrate;
  - 5 a channel waveguide array including a plurality of curved waveguides arranged such that optical path lengths of adjacent ones of the curved waveguides are gradually increased from an inside toward an outside of a curved configuration of the curved waveguides;
  - 10 output waveguides formed on the substrate;
  - a first slab waveguide formed between the input waveguides and the channel waveguide array;
  - a second slab waveguide formed between the channel waveguide array and the output waveguides, and
  - 15 a different refractive index region formed at a position close to the channel waveguide array within the second slab waveguide, the different refractive index region having a refractive index different from a refractive index of the second slab waveguide, and
  - 20 the different refractive index region extending in a direction in which the waveguides of the channel waveguide array are arranged.
2. The optical multi-demultiplexer according to claim 1, wherein the different refractive index region has a lower refractive index than a core of the second slab waveguide.
- 25 3. The optical multi-demultiplexer according to

claim 1, wherein the different refractive index region has a refractive index equal to a refractive index of a clad layer of the second slab waveguide.

4. The optical multi-demultiplexer according to 5 claim 2, wherein the different refractive index region has a tapered shape decreasing in width toward a central portion of the second slab waveguide.

5. The optical multi-demultiplexer according to 10 claim 1, wherein the different refractive index region has a higher refractive index than a core of the second slab waveguide.

6. The optical multi-demultiplexer according to 15 claim 5, wherein the different refractive index region has a reverse-tapered shape increasing in width toward a central portion of the second slab waveguide.

7. The optical multi-demultiplexer according to 20 claim 1, wherein the different refractive index region comprises a pair of peninsular different refractive index regions projecting from both sides of the second slab waveguide toward a central portion of the second slab waveguide.

8. The optical multi-demultiplexer according to 25 claim 1, wherein the different refractive index region is spaced apart from each of both sides of the second slab waveguide.

9. The optical multi-demultiplexer according to claim 1, wherein the different refractive index region

has a width varying in a direction in which the waveguides of the channel waveguide array are arranged.

10. The optical multi-demultiplexer according to claim 1, wherein the different refractive index region 5 has a refractive index varying in a direction in which the waveguides of the channel waveguide array are arranged.

11. The optical multi-demultiplexer according to claim 1, wherein island regions having a refractive index different from each of the first and second slab waveguides are formed, in addition to the different refractive index region, on at least one of a position close to the channel waveguide array within the first slab waveguide and a position close to the channel 10 waveguide array within the second slab waveguide. 15